Maintaining Washington's Roads

PRELIMINARY DRAFT FOR DISCUSSION ONLY

This preliminary draft discussion paper is a work product developed by the consulting team for review and discussion by the Blue Ribbon Commission on Transportation. The contents are intended to provide the Commission members with factual background information and a balanced set of policy alternatives, including the pros and cons of these alternatives. This paper is one of a series and should be reviewed in the context of the entire series that, when taken together, presents a comprehensive overview of the state's transportation system.

This discussion paper has been prepared primarily for Blue Ribbon Commission members new to these issues who wish to engage in a fundamental debate and for a more general audience of interested citizens who may wish to comment on the Commission's deliberations. This paper is intended to be provocative and to stimulate discussion of issues and options in this state. It questions the current ways of doing business, not for the sake of finding fault, but to allow consideration of other potential ways of thinking about transportation issues that might be appropriate in the future.

PROBLEM STATEMENT AND OVERVIEW

The roads, streets, bridges, and highways in Washington represent public assets worth over $100 billion. These investments require regular maintenance and rehabilitation to provide cost-effective transportation services. While the state's highways are generally in good condition, many urban arterials, county roads, and streets are not. Polling and focus groups in Washington, particularly in central and eastern Washington, consistently identify poor maintenance of local streets and roads as a top concern with the transportation system. As a conservative estimate, the total annual cost to drivers in the state of Washington for poorly maintained roads is $156 million, and the average cost per vehicle is $542 over the life of the car.[1] Given the magnitude of public investment and the importance of this issue to the public, the Blue Ribbon Commission on Transportation's discussion of policies to reduce wear-and-tear on the roads and provide cost-effective maintenance and rehabilitation is essential.

[1] Data from the American Automobile Association's 1998 edition of *Your Driving Costs* and the Federal Highway Administration's report *Vehicle Operating Costs, Fuel Consumption, and Pavement Type and Condition Factors*, as cited in Surface Transportation Policy Project, *Potholes & Politics 1998*, November 1998. The report uses a base cost-per-mile of 10.7 cents and an inflation factor of 0.24 for poorly maintained roads.

This paper reviews the extent and condition of the state's road network; causes of poor road conditions; the current approach to road maintenance by the state, counties, and cities; and proposals for reform. The proposals include improving pavement management systems, increasing funding, altering user charges for heavy vehicles, further restricting access to some roads by heavy vehicles, and changing design standards.

BACKGROUND INFORMATION

Extent and Condition of Road Network

The state, counties, and cities own and maintain almost 80,000 centerline miles of roadway within Washington. Centerline miles measure the extent of the road without regard to the number of lanes. Thus, it literally measures the length of the painted line dividing the road into two sections. Figure 1 shows the distribution of the centerline miles by owner and road type. State highways include three different road types: interstate, urban, and rural. County and city road types include urban local streets, urban arterials, and rural roads.

Figure 2 shows vehicle miles traveled, lane miles, and expenditures by jurisdiction. Current expenditures, which include maintenance and new construction, correlate more closely with vehicle miles traveled (VMT) than lane miles. Cities' share of lane miles is approximately the same as their share of spending. State spending is less than its share of VMT, while county spending is more than its share of VMT.

State Highways

The Washington State Department of Transportation is responsible for maintaining and preserving Washington highways. The state highway system includes over 7,000 centerline miles: 764 interstate miles; 5,453 rural miles; and 820 urban miles.[2] Over the next 20 years, WSDOT projects spending $6.44 billion to maintain and preserve the state highway network.[3] Figure 3 shows that the percent of the state highway system considered in "poor" or "very poor" condition has declined since 1980.

The introduction of the pavement management system and lowest lifecycle cost methods has helped to reduce the road segments in "poor" condition to 7 percent and "very poor" condition to 1 percent.[4] WSDOT policy places the highest priority on maintenance and preservation of roadways in an effort to take care of the existing system before undertaking other efforts. Given this policy priority, the state can fully fund its maintenance and preservation programs for state highways over the next 20 years using current resources.[5] This commitment should reduce the proportion of pavements in the "poor" and "very poor" range to an acceptable level.

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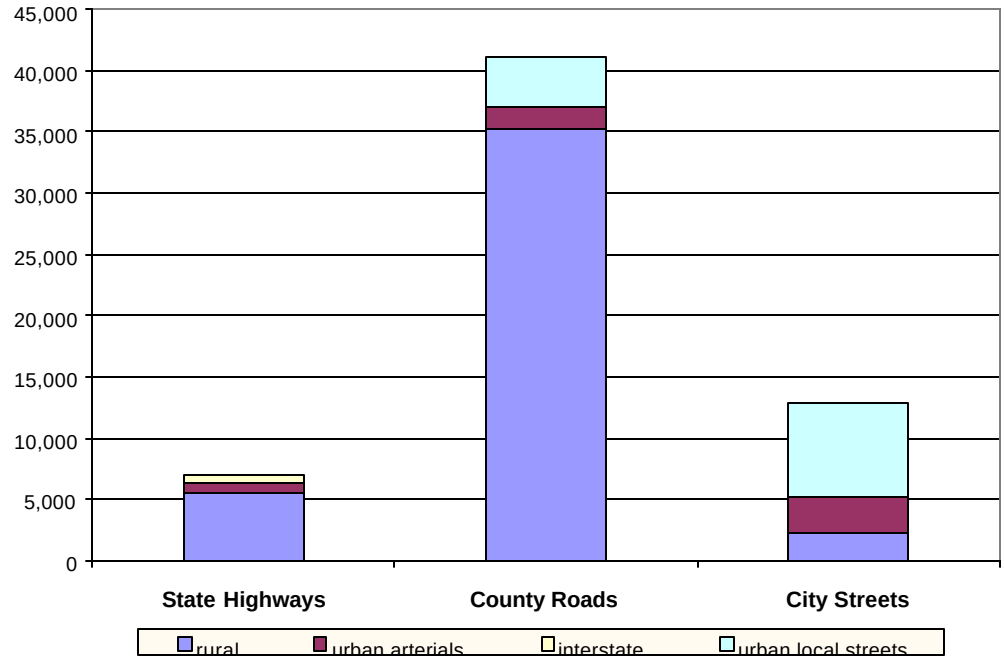
[2] Washington State Department of Transportation, *Key Facts: A Summary of Useful Transportation Information*, January 1998. Centerline miles measure the length of the road but does not account for the number of lanes.

[3] Washington State Department of Transportation, *Washington's Transportation Plan: 1997-2016*, April 1996.

[4] Paula Hammond, Washington State Department of Transportation, April 14, 1999, presentation to the Investment Strategies Committee, Blue Ribbon Commission on Transportation.

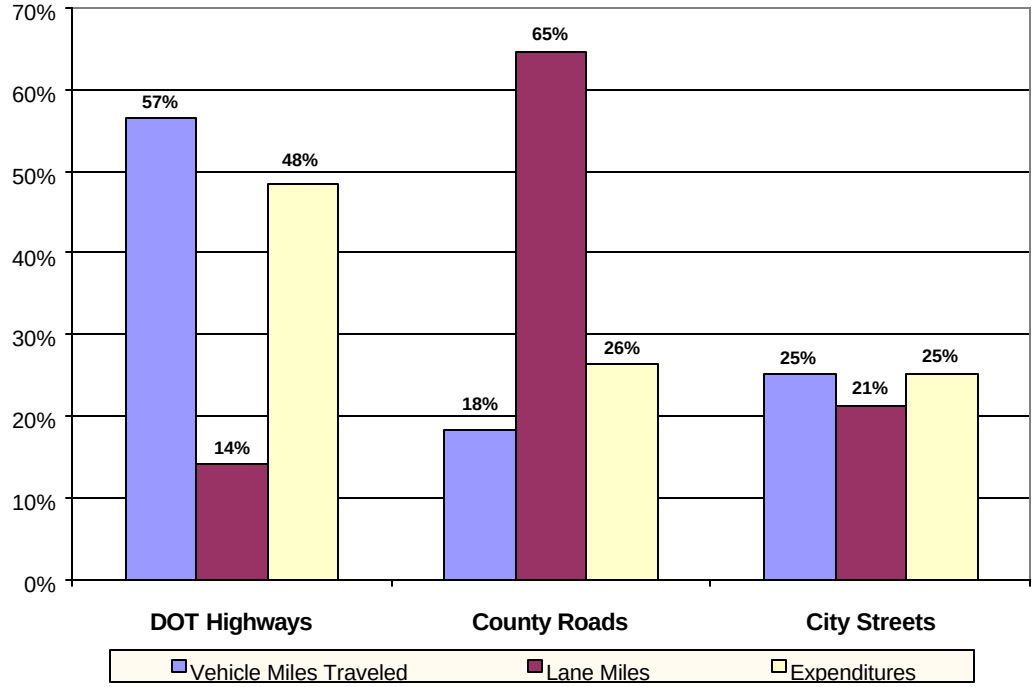
[5] The research for this paper was conducted prior to the passage of Initiative 695; accordingly, it does yet not address any changes in the state's funding situation that may result from implementation of the initiative.

Figure 1: Centerline Miles of Washington Roads, by Jurisdiction and Type



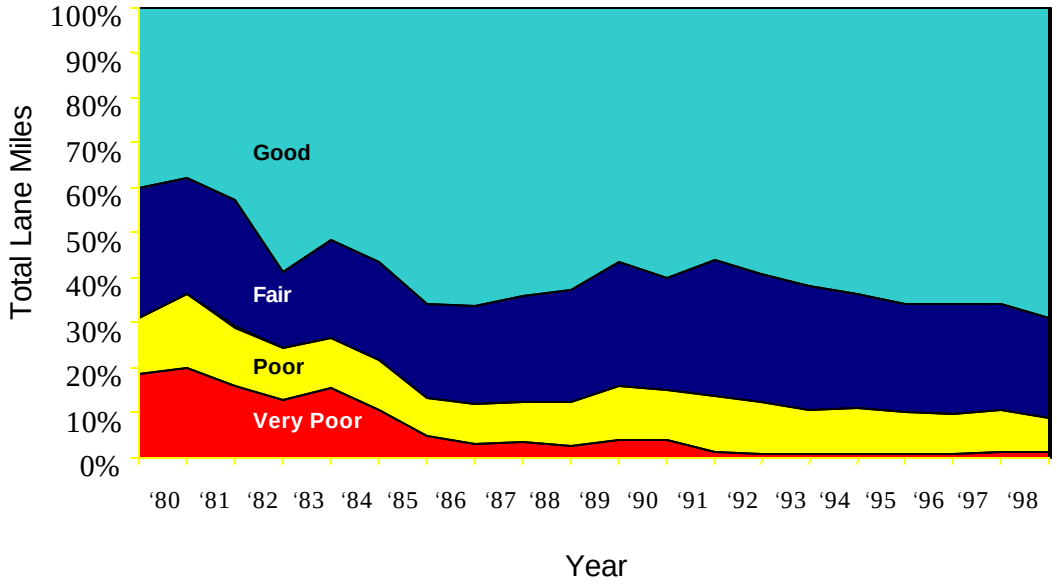
Source: Washington State Department of Transportation, *Key Facts: A Summary of Useful Transportation Information*, January 1998.

Figure 2: Washington Road Usage and Expenditures



Source: Washington Transportation Alliance Policy Group, *Expenditure Transportation History: Preliminary Report*, October 5, 1998 (unpublished report).

Figure 3: State Highway Structural Condition



Source: Washington State Department of Transportation.

In 1998, the Joint Legislative Audit Review Committee (JLARC) examined WSDOT's highway programs. Among other findings, the auditors concluded that the process WSDOT uses in the development of its pavement rehabilitation priorities is a reasonable approach. The JLARC study also included the following statement:

> The comparison of physical maintenance expenditures shows that Washington's costs are $7,487 per system mile, while the nationwide average of 50 states' costs is $9,597 per system mile. WSDOT is 22 percent below the average expenditure per system mile nationwide.... With snow removal included, WSDOT's maintenance expenditures are almost eight percent lower than the average for all states.[6]

County Roads

Washington's 39 counties own a road network that contains more than 41,000 centerline miles and has an estimated value of $22 billion.[7] Approximately 35,274 miles are rural; 1,846 miles are urban arterials; and 3,974 are urban local streets.[8] Of those roads, 37% are unpaved and the vast majority (87%) is rural. According to staff at the County Road Administration Board (CRAB), the current funding resources available for county roads cover only two-thirds of the maintenance needs each year.

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[6] Cambridge Systematics for the Joint Legislative Audit and Review Committee, *Department of Transportation Highways and Rail Programs Performance Audit: Final Report*, March 13, 1998.

[7] This number is from an April 14, 1999, presentation to the Investment Strategies Committee by Christine Mudgett of the County Road Administration Board. This figure includes county ferries and bridges more than 20 feet long.

[8] Washington State Department of Transportation, *Key Facts: A Summary of Useful Transportation Information*, January 1998.

Because the counties own the majority of rural roads, they also have the largest network of unpaved roads. Unpaved roads present a unique challenge because they are not used frequently enough to justify paving, but they tend to be harder to maintain. Gravel roads cost more to maintain, especially when repair crews must travel long distances to reach them, or when increasing traffic volumes require more frequent maintenance.

No set standards exist for paving gravel roads. Rather, each county determines the appropriate time to pave gravel roads within its jurisdiction. Paving often occurs when traffic volumes on the road increase or, in the case of urbanizing counties, when the only stretches of gravel road are located in isolated areas of the county. The type of traffic using the road, its effect on adjacent property owners, and expectations of property owners also play a role in determining the optimal time to pave a gravel road.[9]

City Roads

Washington's 279 cities and towns own and maintain a road network of almost 13,000 centerline miles. Approximately 2,275 miles are rural; 2,896 miles are urban arterials; and 7,739 miles are urban local streets. City streets typically include more pedestrian amenities than county roads or state highways; city streets may have bicycle lanes and paths, sidewalks, streetlights, plants, and other features.

According to the Association of Washington Cities, cities are able to finance only one-third of their maintenance and preservation needs on average, leaving unfunded maintenance needs of $1.4 to 2.2 billion. Medium and large cities typically rate their pavement condition in the "fair" to "good" range, while smaller cities often rate their pavements as "poor."

Major Contributors to Wear-and-tear on Roadways

Much of the damage to roads is caused by excessive stress from weather, heavy vehicles, or both. Inadequate maintenance also contributes to wear-and-tear on roads, as vulnerable roads deteriorate more quickly than roads in good repair. Suboptimal investments in pavement – that is, building roads with weaker materials due to budget limitations – also makes roads more susceptible to breakdown. The following section discusses physical elements that contribute to wear-and-tear on roadways and the role of heavy vehicles.

Physical Elements

Vehicle travel and weather are the main causes of damage to roadways. Vehicles with studded tires cause rutting and roughness on roads. Because of their weight, trucks also cause rutting and cracking. Additionally, as the weather cools and warms, roads are susceptible to further cracking and potholes. Frost causes cracks in the road surface to widen, allowing water to infiltrate the lower parts of the highway structure, damaging it and lessening its ability to withstand future loads. After many years, asphalt loses its flexibility, becoming brittle and more likely to crack under loads. When these effects interact with each other, the weathering of pavements in conjunction with heavy vehicle use causes significant road deterioration. This problem is particularly apparent in eastern Washington, which experiences greater ranges in temperatures throughout the year.

[9] Personal communication with Christine Mudgett, County Road Administration Board, May 17, 1999.

Roads are either constructed with rigid or flexible pavements. Rigid pavements, typically made of Portland concrete, are light in color and extremely hard. When subjected to stress, they tend to crack rather than deform. Flexible pavements have some compressibility, especially in warm weather. They are made of asphaltic concrete, and are commonly called asphalt or blacktop. Stress from above, usually from excessive weight, can damage both types of pavements. The stress on the pavement itself, as well as the moisture and temperature conditions underneath the pavement, cause motion in the underlying soil that can further damage pavements.[10]

Heavy Vehicles

Heavy and large vehicles impose more damage on roadways than passenger vehicles. Road wear-and-tear increases exponentially with the weight of the vehicle load per axle.[11] Trucks cause considerably more wear-and-tear on arterials and roads than on the interstate, because cities and counties have not invested in more expensive and durable pavements that can withstand the weight of trucks over the life of the pavement. These thinner pavements on city and county roads have proven costly due to the higher maintenance burdens, and they have left local road departments with serious backlogs in maintenance needs.

Current user fees consist of gas taxes and vehicle registration fees. Though trucks and other heavy vehicles pay a sizable amount, the money collected is insufficient to offset the costs that these vehicles impose on roadways and other users.[12] Additionally, because the fees are not directly related to the particular roads on which trucks travel, shipping companies do not have the information or incentive to choose the most durable or socially optimal route in shipping goods.

How Roads are Currently Maintained

Lowest Lifecycle Cost Approach

In the past when planners tried to secure funding for road construction, they did not always consider the continuing costs associated with operating and maintaining a road system. Successful highway management requires adequate funding for maintenance and operation, including funding to replace components when their useful lives have expired.

The lowest lifecycle cost method of maintenance examines the cost per lane mile for repair and compares it with the rehabilitation schedule for actual lane miles. By matching the annual cost of maintenance with the rehabilitation cycle, planners can determine the year with the lowest cost to maintain or rehabilitate a roadway. Maintaining a road on a short rehabilitation cycle will prove costly because of the unnecessary expense of repaving too frequently. However, an overly

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[10] Kenneth Small, Clifford Winston, and Carol Evans, *Road Work: A New Highway Pricing & Investment Policy*, 1989.

[11] Kenneth Small, Clifford Winston, and Carol Evans, *Road Work: A New Highway Pricing & Investment Policy*, 1989.

[12] According to a memorandum from the Washington Trucking Associations, dated September 7, 1999, the average annual amount of state fees and taxes contributed by the owner of a tractor/trailer combination licensed for 80,000 pounds is over $7,000. The owner must also pay an average of over $6,500 per year in federal taxes and fees. Despite this large amount, money collected remains insufficient to offset the costs that heavy vehicles impose on the roadway and other drivers. Such costs include road maintenance, more expensive pavement investments, environmental damage, noise, and other external costs.

long rehabilitation cycle will prove more costly because major repairs will be needed to improve the road condition to a satisfactory level. By scheduling rehabilitation at the least cost, agencies can minimize maintenance costs. The method also helps highway designers determine the desired durability of roads – that is, the point where the incremental cost of investing in durability is equal to the incremental savings in maintenance.

The overarching investment principle regarding maintenance is that the benefits gained from repaving or rehabilitating a roadway must exceed the costs of the effort. In general, the lowest lifecycle cost method is consistent with this principle, *except* when roads are not used to their designed capacity. In such a case, the lowest lifecycle cost approach may result in over-investment.[13]

Pavement Management System

Highway managers created the pavement management system (PMS) in the early 1980s to help systematically maintain roads in an efficient manner. The PMS is a computerized tracking system for pavements. After transportation managers enter information, the PMS catalogs road segments and keeps records of pavement types, conditions, and characteristics in order to determine the optimal maintenance for each road type. The American Association of State Highway and Transportation Officials' manual states that PMS "is designed to provide objective information and useful data for analysis so that highway managers can make more consistent, cost-effective, and defensible decisions related to the preservation of a pavement network. While a PMS cannot make final decisions, a PMS can provide the basis for an informed understanding of the possible consequences of alternative policies."[14]

The Washington State Department of Transportation was the first U.S. state to have a functional, operational PMS in effect.[15] WSDOT's pavement management system covers the state's entire highway network. It considers pavement distress, rutting, roughness of ride, and surface friction in calculating appropriate maintenance and rehabilitation measures. Most of the larger cities and all counties in the state have adopted some type of pavement management system, although many smaller jurisdictions have not yet done so.[16]

Because it saves money, routine use of a PMS would allow a city to predict its needs and help maintain existing pavement performance on a lower budget or improve performance standards within an existing budget. A WSDOT study found that using a PMS helps determine the condition of the road system, systematically analyze pavement life cycles to determine the optimal time and the most cost-effective method for preservation work, prioritize needed

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[13] In general, the lowest lifecycle cost for maintenance of roads and highways represents an optimal social investment in roadways, assuming the initial design and sizing of the road passed a rigorous benefit-cost test. If, however, the design of the roads does not correspond with the actual level of use on a road segment (that is, the road is "overbuilt" for given the level of demand), least lifecycle costs may prove inefficient. In such a case, it may not be necessary or desirable to repave an underused road at the time determined by the least lifecycle cost method.

[14] *AASHTO Guidelines for Pavement Management Systems*, American Association of State Highway Transportation Officials, July 1990.

[15] R. Keith Kay, Joe P. Mahoney, and Newton C. Jackson, *The WSDOT Pavement Management System – A 1993 Update*, Washington State Transportation Center, September 1993.

[16] The County Roads Administration Board now requires that all county road departments use a PMS for maintaining their roads or risk losing gas tax revenues.

maintenance and preservation activities, and develop pavement rehabilitation budgets that will prevent major road deterioration. It also provides an objective, reliable, and current database of information; allows improved response to legislative or public requests regarding roadway improvement plans; and gives a common basis for evaluating pavement maintenance needs across the state. [17]

POSSIBLE SOLUTIONS

In the Investment Strategies Committee meetings, several ideas emerged for policies to improve maintenance and rehabilitation of roads. Representatives from city, county, and state government presented possible solutions the Committee. This paper rates the policies on the general criteria that the Committee adopted for evaluating proposed investment strategies: potential to improve the condition of roadways, cost-effectiveness, ability to produce measurable results, public acceptability, administrative feasibility, and impact on safety.

Table 1: Matrix of Policy Solutions

Policy	Improves condition of roadways	Cost – Effective	Produces Measurable Change	Public Acceptability	Administrative Feasibility	Improves Safety
Increased funding	Excellent	Good	Good	Moderate	Easy	Excellent
Charge heavy vehicles by weight and road type	Excellent	Excellent	Excellent	Poor	Moderate/Poor	Excellent
Extend the use of PMS to all cities	**Under development**					
Develop freight only lanes						
Encourage more inter-local partnerships						
Improve management of utility cuts						
Reform tort liability/Revise design standards						
Limit the use of studded tires						

Source: Evaluation by ECONorthwest

Solution #1: Increase Funding

One way to ensure that maintenance and rehabilitation occur regularly is to change policy directives to prioritize and fund all maintenance needs in the state. This policy change would minimize damage to roads and cars. If the lowest life cycle cost method and pavement management systems were used, it would also minimize the cost of repairing roads.

[17] Ram B. Kulkarni and Fred N. Finn, *Pavement Management System: Demonstration for Washington Counties*, Washington State Department of Transportation, June 1986.

Background & Rationale

Because the value of the gas tax has declined in real dollars over the past decade, money available to fund maintenance projects is dwindling. As a result, counties and cities have had to rely on property taxes to build or maintain roads. Non-discretionary funds are also an unstable source of income since they are tied to specific projects. Fully funding maintenance and rehabilitation needs throughout the state would significantly improve the condition of roads and allow agencies to maximize their investments in road capacity.

Proponents raise the following arguments in support of increasing funding:

- **Funding is desperately needed and long overdue.** Road departments are now in the position of trying to choose from a long list of projects in dire need of attention, especially at the city and county level. These departments are unable to take adequate care of the public investments already made.
- **Encourages efficient scheduling of road maintenance.** By funding the optimal level of maintenance and rehabilitation, planners and policymakers minimize the cost of maintaining roads and make maintenance predictable.
- **Opportunity to catch up on maintenance needs.** Increasing funding for maintenance and rehabilitation programs will eliminate the backlog of projects and allow agencies to keep pace with future maintenance needs as they arise. Further delay in addressing the backlogged projects will further increase the cost of repairs, as complete rehabilitation may become necessary instead of routine maintenance.

Opponents raise the following counterarguments:

- **Does not properly align incentives or fix the problem.** Spending more money on the problem does not change the underlying issues that cause poor maintenance. Unless user incentives are made to coincide with actual costs, those causing the damage will continue to behave as they have in the past. Gas tax dollars have declined in real terms, but an infusion of money into the system will help to meet only the existing need for maintenance. Such an increase does not address long-term viability or funding, especially if the funding encourages new construction that will also require maintenance.
- **Too costly.** Though fully funding maintenance ensures an efficient and predictable schedule and helps minimize the cost of maintaining roads, it may not be the optimal use of societal resources. As a result of infrequent use, some roads do not need maintenance as frequently as the least lifecycle cost method may dictate.
- **Public Skepticism.** The public is already skeptical about government spending and is not willing to encourage inefficient spending on larger transportation budgets.

Performance on Evaluative Criteria

SOLVES THE MOST CRITICAL PROBLEM FIRST

Immediately funding all maintenance needs would allow highway managers to fund all needs currently in backlog status as well as maintenance and rehabilitation needs that are current or projected. This type of a policy would certainly help to preserve the value of the transportation system. However, it is debatable as to whether this policy will prevent the problem from occurring in the future because it does not address some underlying causes of the problem, which are systematic and are not related to maintenance schedules.

COST-EFFECTIVENESS

If increased funding helps to move planners to the optimal maintenance schedule, then the policy would be cost-effective. Otherwise, if funds are used to pay for maintenance needs not subject to a benefit-cost criterion, an over-investment in maintenance may result.

PRODUCES MEASURABLE CHANGE

Providing enough money for all jurisdictions to maintain roads properly under the lowest lifecycle costs would produce noticeable change: fewer potholes and less roughness, reduced rutting, and a better ride.

PUBLIC ACCEPTABILITY

Because the public perceives maintenance as a significant problem, people may support policies that reduce maintenance needs. However, voters are generally skeptical about government spending and its ability to solve problems, especially when such efforts involve tax increases. Increased funding through the gas tax or other user fees will likely encounter public opposition.

ADMINISTRATIVE FEASIBILITY

The administrative structure is already in place to appropriate funding and apply it to road maintenance and rehabilitation. WSDOT is required by law to use a pavement management system. The County Road Administration Board requires counties to use a PMS in order to receive County Arterial Preservation Account funds and gas tax dollars. Some cities use a PMS to determine the optimal maintenance schedule, but many cities do not have a PMS maintenance system in place. Thus, these cities would need to invest some money to develop or update a PMS for their jurisdictions.

MAINTAINS OR ENHANCES SAFETY

The rutting criterion of the pavement management system relates directly to the safety of driving in ruts that are deeper than one-half inch. Thus, this policy would enhance safety by providing better maintenance of roads and reduced rutting.

Areas of Uncertainty and Debate

Most people agree that fully funding maintenance and preservation needs in Washington would significantly improve road conditions. However, some areas of uncertainty and debate exist regarding the following issues:

- The source of funding.
- The trade-off between investments in maintenance and investments in new capacity to reduce congestion.
- How to align incentives properly for road usage, and create policies to encourage more efficient use.

Solution #2: Alter User Charges for Heavy Vehicles

Another proposed solution to the maintenance problem is to charge heavy vehicles higher user fees based on weight or number of axles and the type of road they use. Fees would increase sharply with axle weight and could supplement or replace current gas tax revenues. Fees would accompany increased investments in road durability to minimize maintenance needs in the future.

Background & Rationale

Significant debate exists regarding whether all users of the transportation system pay for the services that they use. Railroads have historically constructed and maintained their own tracks. Trucks and barges, on the other hand, typically use roads and waterways that government agencies construct and maintain.[18] Thus, they profit from the public investment in infrastructure and pay a relatively low price to use the facility. If some truckers or barge operators do not have to pay for their use, those receiving subsidies have an unfair advantage, and shipper choices are distorted.

The national Transportation Research Board argues that "it is desirable that shippers and carriers pay the full social costs of their freight operations – that is, that the special taxes and fees paid by the shipper or carrier for each shipment of freight be enough to offset the cost to the government of the shipment and the external costs that the shipment imposes on others."

The current road finance structure does not provide adequate funds to maintain roads or provide incentives for the proper use of roads. User fees would allow a more direct method of financing that encourages shippers to make efficient decisions. Economic efficiency focuses on whether individual purchases of freight services occur at prices that coincide with costs, not whether the sum of all payments equals to the sum of all costs.

The proposed change in user charges would be calculated based on the marginal cost of maintenance (per axle passage). Policymakers should consider two costs in examining this issue:

1. **Maintenance of roads.** The weight per axle on each vehicle plays a significant role in the damage caused to roadways, as illustrated in the following examples:
   - The rear axle of a typical 13-ton van causes 1,000 times more structural damage to a road than a car. If that van is loaded to 19 tons, it causes 3,000 times more structural damage than a car.
   - A 50,000-pound two-axle truck causes more damage to roads than a 100,000-pound seven-axle truck.[19]
2. **Vehicle damage and reduced speed**. Roads that are not optimally maintained cause damage to other vehicles on the roads.

Thus, a user charge should take into account both sets of costs and should relate to axle weights, not simply the number of axles or the total weight.

Requiring shippers to pay the full cost of their individual shipments might create a shift to driving trucks with more axles, which would decrease the load-per-axle ratio and reduce the damage to roads.[20] Shippers might also switch to rail, which would help eliminate additional

[18] Transportation Research Board, *Paying Our Way: Estimating Marginal Social Costs of Freight Transportation*, 1996.

[19] Examples from Kenneth Small, Clifford Winston, and Carol Evans, *Road Work: A New Highway Pricing & Investment Policy*, 1989. Though Washington does not permit two-axle trucks of such weight, this illustration highlights the damage that overweight vehicles can cause.

[20] While axle weight is the most relevant for road surfaces, total vehicle weight remains important for bridges, which must bear the entire vehicle load at once.

road damage. Additionally, increased investments in optimally durable roads would reduce the susceptibility to pavement breakdown and prolong the period between rehabilitation cycles. Once heavy vehicles are required to cover the full costs of their activities, shipping companies will have to consider additional efficiencies for transportation.

Proponents raise the following arguments in support of user fees based on maintenance costs:

- **Encourages efficient use of road network.** Accurately pricing road use ensures an efficient allocation of societal resources among various modes and overall. If shippers pay the full cost, they decide to use trucks only if the value of a service is at least as great as the cost; otherwise, it is not profitable.
- **Improves fairness.** User fees would also allow gas and other local taxes to fund more maintenance of roads, especially on county roads and city streets. Revenues that trucks generate do not currently cover the full cost of their impacts on roads.
- **Increased revenue for maintenance.** Currently, agencies have to assemble the funds for infrastructure investments by gathering money from federal, state, and local sources, an unreliable method of road finance. User charges are more stable and can be set at rates that fully fund maintenance programs.
- **Improved efficiency for shipping industry.** Experts have found that if these fees replaced gas taxes, they might actually prove less costly to shippers.[21] If adopted nationwide, such a policy could save 75 percent of the current maintenance costs, increase investment in road durability, and cause a shift in vehicles or modes.

Opponents raise the following counterarguments:

- **Harms trucking industry and customers.** A common concern is that consumers will pay the fee through higher prices for goods and services because shipping costs will rise.
- **Difficult to charge variable road fees by axle weight.** In the past, variable pricing has been administratively infeasible because of the resources it requires. However, the advent of electronic toll collection (ETC) and global positioning system (GPS) technologies makes administering such fees more technically feasible.[22]
- **Too drastic a move.** Historically, road users have not paid the full social costs of their activities; rather, fees have covered only the budget of road departments. Such a move could be too disruptive to public financing.
- **Significant reforms have previously failed.** The shipping industry has opposed similar efforts at the national level to increase the proportion of fees paid toward road maintenance. Additionally, the benefits of using the road system more efficiently are not obvious to many.

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[21] For a thorough discussion of a national pricing policy based on the marginal cost of maintenance, see Kenneth Small, Clifford Winston, and Carol Evans, *Road Work: A New Highway Pricing & Investment Policy*, 1989.

[22] Randy Pozdena, *Where the Rubber Meets the Road: Reforming California's Roadway System*, Reason Foundation, 1995.

Performance on Evaluative Criteria

SOLVES THE MOST CRITICAL PROBLEM FIRST

By establishing a more direct method of road financing, planners can generate revenues to keep pace with maintenance burdens. Charging higher fees for heavy vehicles creates proper incentives by matching appropriate charges to those imposing the most damage. Trucks and buses would have to pay more to drive on roads, and the money generated would go directly into road maintenance funds.

COST-EFFECTIVENESS

Because heavy vehicles represent a low volume of traffic, imposing a maintenance charge only on trucks would be expensive without automated technology and global positioning systems that track their location. With GPS for monitoring road usage, the cost of administering these charges is minimal. Experts estimate that implementation of such a program would cost a penny per vehicle-mile traveled or less, as technology continues to reduce costs. For relatively low public costs, imposing user fees would generate revenue, potentially shift truck traffic, increase investment in durability of roads, and decrease the maintenance burden.

PRODUCES MEASURABLE CHANGE

Charging trucks fees in proportion to the costs they impose will change the handling of freight shipment in this state. The revenue from the user fees available for maintenance and rehabilitation activities would enable substantial improvements in durability and maintenance, especially for counties and cities.

PUBLIC ACCEPTABILITY

The trucking and shipping industry vehemently oppose this policy. They fear that the fees will have a negative impact on the their industries. The history of opposition at the state and federal level extends back as far as the early 1950s. Since that time, truckers and other highway interests have contested cost allocation studies, and no consensus exists on what constitutes an appropriate user charge.

ADMINISTRATIVE FEASIBILITY

The highway finance system currently collects higher fees from trucks and is capable of collecting and distributing funds. Automatic tracking and billing of usage would improve the feasibility of these programs; recent improvements in technology make this approach more feasible.[23] Alternatively, weigh stations already exist along the sides of several freeways, and these stations could be used should automated technology not prove feasible or desirable. One concern with the current administrative structure is the lack of a guarantee that the revenue generated by such fees would go directly to road maintenance.

MAINTAINS OR ENHANCES SAFETY

Enforcing weight restrictions could enhance safety on roads by reducing rutting or decreasing the number of trucks on roads. Additionally, the revenue generated would enable improved

[23] Randy Pozdena estimated implementation costs to be no more than a penny per vehicle mile traveled in *Where the Rubber Meets the Road: Reforming California's Roadway System,* Reason Foundation, 1995.

maintenance of roads, and the investments in durability would decrease rutting on roadways, both of which enhance safety.

Areas of Uncertainty and Debate

Like congestion pricing, this proposed policy has generated fierce debate. Imposing fees related to the marginal cost of usage for facilities is a relatively new idea in road finance. Areas of particular uncertainty include the following issues:

- The nature of maintenance problems makes it difficult to determine with certainty the relative contributions of weather and trucks to the deterioration of roads.
- The cost of implementing a user fee for trucks is dependent on the availability of technology and the extent to which agencies desire to vary the fees.

The Investment Strategies Committee has discussed the following potential solutions, which are presented here in summary form.

Solution #3: Develop Freight-only Lanes

One way to reduce the maintenance burden on highways is to develop more durable freight-only lanes. Creating such lanes would minimize the amount of road surface subjected to high weights, prolonging the life of the pavements. Though enforcement may be an issue, this restriction could prove to have significant benefits. The development of freight-only lanes could permit less expensive design and construction on the non-freight lanes.

Solution #4: Extend the Use of the Pavement Management System

Requiring cities to use a pavement management system to monitor and maintain their road network would provide many benefits to the cities and the public they serve. In addition to quantifying the needs in a consistent manner, a PMS would allow cities to predict their future maintenance needs and set appropriate budgets. The current difficulty is in providing adequate staff to collect data and administer the PMS at the city level. One alternative is to coordinate with other jurisdictions to share resources.

Solution #5: Encourage Inter-local Partnerships

Inter-local partnerships may provide opportunities for greater efficiencies for cities and counties. Rather than maintaining several different road maintenance shops within one area, cities might contract with their county or WSDOT for some road maintenance services in their jurisdictions.

Solution #6: Improve Management of Utility Cuts

Cutting pavement is frequently required to repair water, gas, power, and telephone lines as well as for new service installation. While necessary to maintaining utility service, open cuts in pavement compromise the structural integrity of roads. WSDOT has reviewed studies that indicate that regardless of how well a utility cut is restored, the pavement area on each side of the trench is permanently damaged.[24] Each jurisdiction has its own set of standards for handling

[24] Letter from Larry Messmer, Utilities Engineer, Washington State Department of Transportation, May 26, 1999.

open cuts in pavement by utility companies. Better and more consistent management of utility cuts could lower maintenance costs and improve road conditions.

Solution #7: Reform Tort Liability/Alter Design Standards

The joint and several liability standards in Washington state law make it difficult to construct roads below design standards. These standards can result in roads and streets that are "overbuilt" given their level of use and are more expensive than necessary. The combination of high design standards and tort liability if roads do not meet these standards raises the cost of building and maintaining roads. However, the design standards exist for a reason; they improve safety or fulfill other societal goals and should be carefully considered before modification.

Solution #8: Limit Use of Studded Tires

Studded snow tires improve traction on icy and wet roads during winter months. Studded tires produce significant wear-and-tear on pavement surfaces, resulting in increased maintenance and rehabilitation costs, along with safety concerns. Years of wear from studded tires have worn grooves in concrete slabs, increasing the potential for vehicles to hydroplane. This situation is particularly true on the Seattle I-5 and Spokane I-90 corridors. The higher the traffic speeds, the higher the rate of pavement wear from studded tires. According to the Washington State Department of Transportation, certain types of paving mixes that reduce traffic-generated noise, splash, and spray cannot be used because of their excessively high wear rates from studded tires.[25] Limiting the use of studded tires would improve road conditions and lower maintenance costs by reducing the wear on pavements.

CONCLUSION

The key to well-maintained roads is investing in durable pavements and minimizing the damage caused by vehicles. Backlogs of maintenance needs and limited funding also prevent jurisdictions from effectively maintaining their investments. Roads in poor conditions are costly to drivers and the agencies trying to fix them. Prioritizing maintenance projects and limiting use of roads by heavy vehicles and automobiles with studded tires would improve road conditions and extend the life of our transportation network.

[25] Washington State Department of Transportation, *Washington State Highway Pavements: Trends, Conditions, and Strategic Plan,* January 1999.